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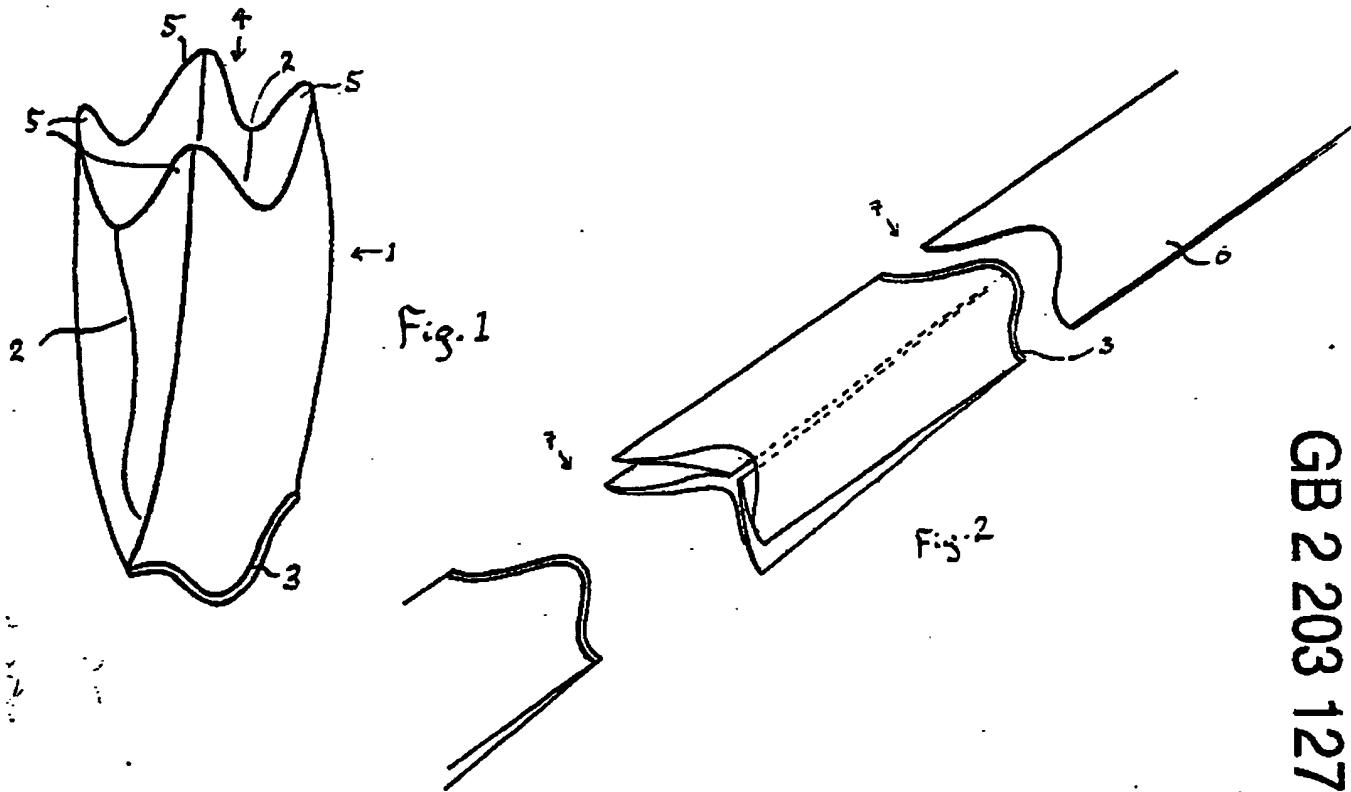
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## (54) Closable bag

(57) A lay-flat bag or sack, e.g. for refuse, of plastics sheet material having gussets 2 at both sides folded inwardly, the top and bottom edges 4, 3 of said bag having complementary arcuate configurations, the side gussets being trapped in the folded position by the bottom closure 3, the top of said bag being openable to provide four projections 5 which may be knotted together in opposite pairs to substantially close the top of the bag. The projections may include hand holes, and the tied projections form a lifting handle. The bag is formed by dividing a gusseted tube 6 into portions by transverse arcuate cuts 7, and heat or solvent welding the convex base ends 3.

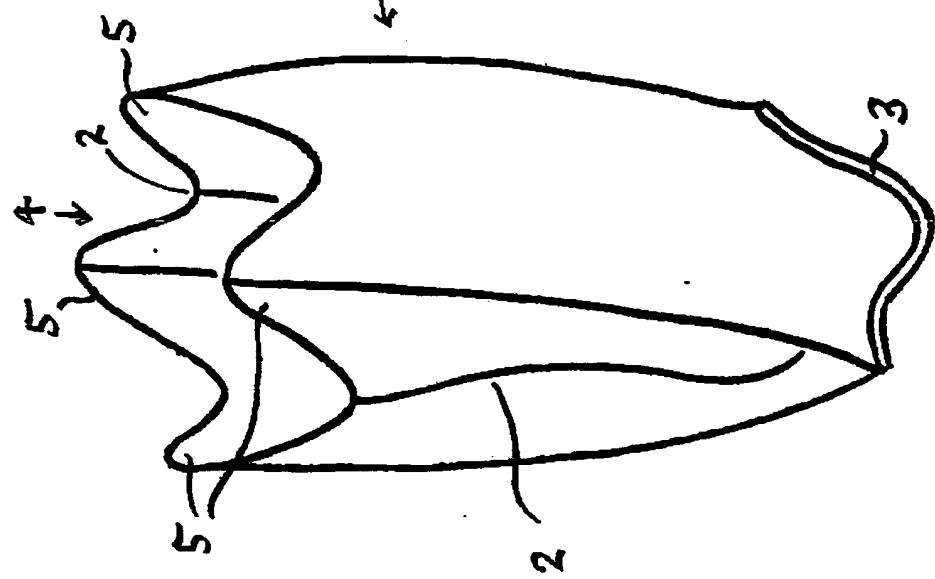


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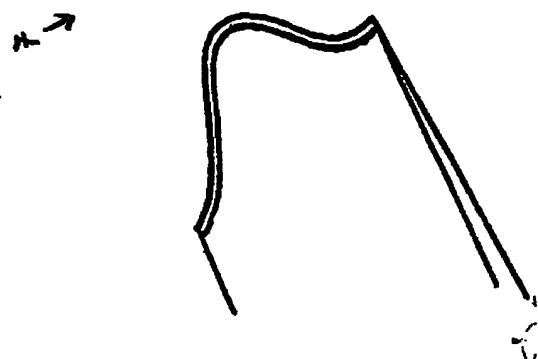
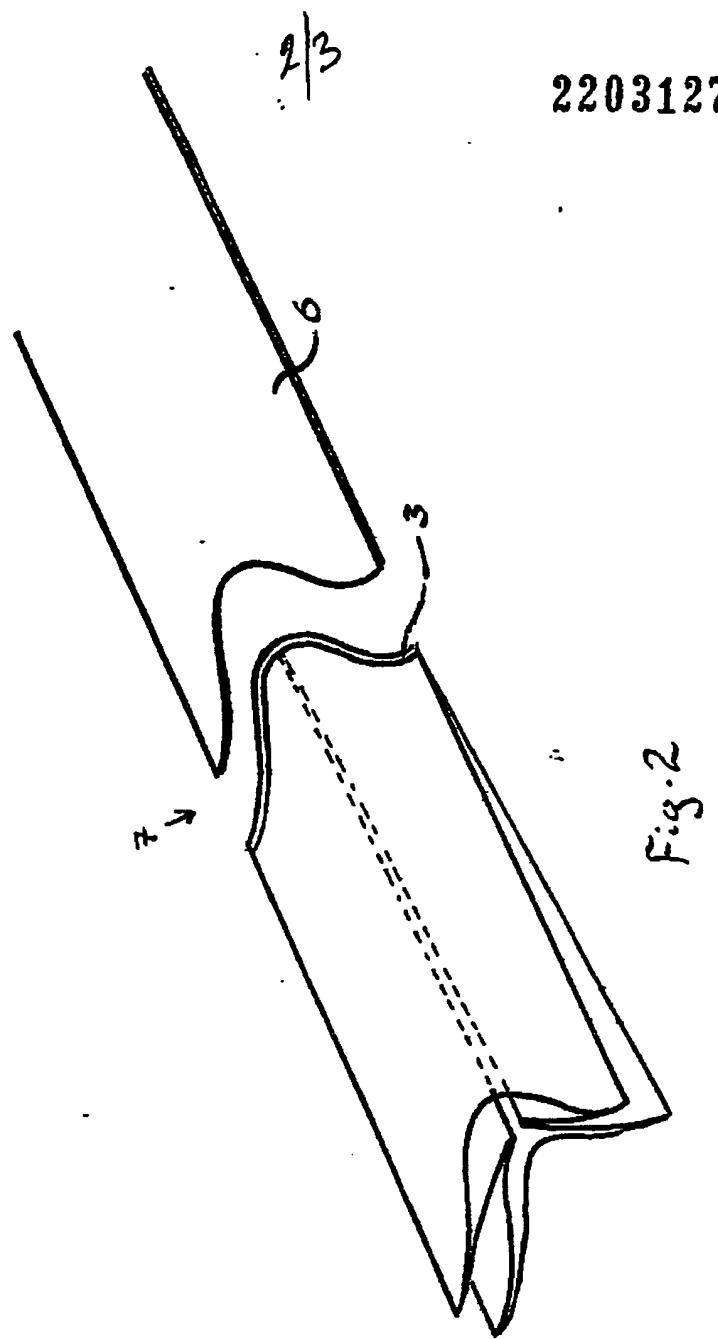
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Fig. 1

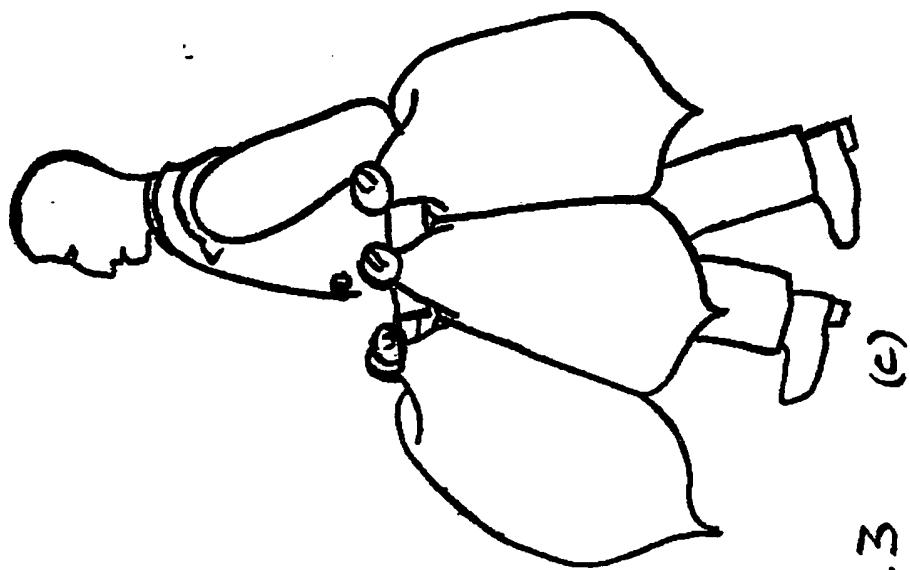


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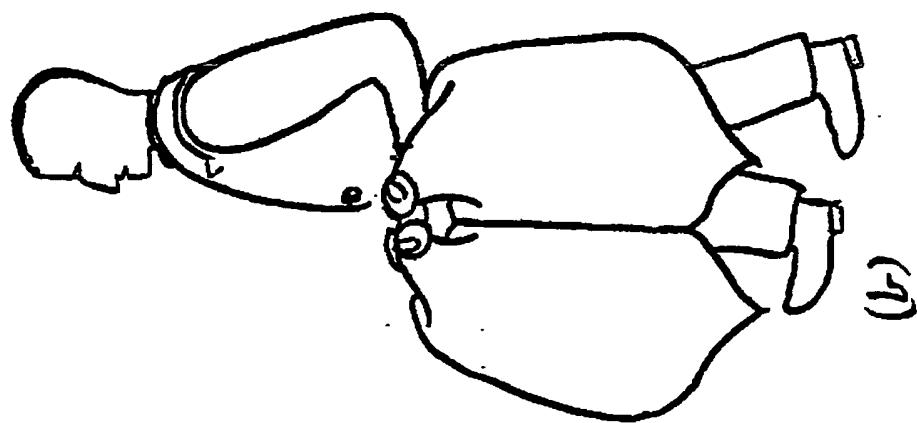
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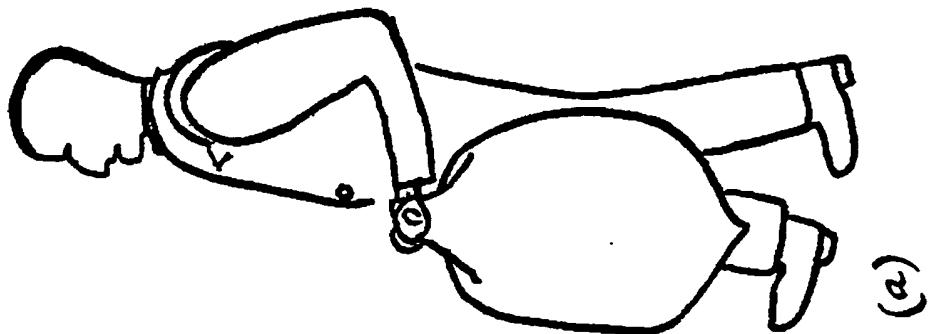


(c)

Fig. 3



(b)



(a)

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Closable Bag

The present invention relates to a bag which  
5 incorporates a simple means for both closing the  
bag and forming a carrying handle while maximising  
the economical use of the material from which the  
bag is made.

Bags of all descriptions are widely used in  
10 our modern way of life, not only for simply wrapping  
goods, both large and small, for protection and to  
prevent soilage, but also as a simple means for enclosing  
and carrying them. In both home and industry, heavier  
duty plastic bags serve as containers for refuse  
15 and produce e.g. industrial waste, household rubbish,  
farm produce, laundry and food.

The problem with all these types of bag is  
that their basic flattened outline is rectangular  
and no obvious or convenient means for closing or  
20 carrying the filled bags exists. It is, of course,  
possible to simply grasp the top of the bag and/or  
support its base in order to carry the bag and its  
contents. This procedure includes a high risk of  
spilling the contents which can be not only unhelpful  
25 but, in the case of refuse bags, unpleasant, unhygienic  
and possibly even hazardous. An alternative solution  
is to fasten and seal the tops of the bags, either  
by simply folding down, sticking, twisting and/or  
knotting the bag or by constricting the top of the  
30 bag with some sort of additional fastening means  
e.g. flexible plastics coated wire, adhesive tape,  
or a clamping device. These methods are not ideal,  
not only because of the need for, in some cases,  
additional items and/or apparatus but because in  
35 all such situations wasteful loss of otherwise usable  
space within the bag occurs. Furthermore, carrying  
of the closed bags is not facilitated.

The use of so-called "carrier bags" is well known in the art. Carrier bags tend to be made of plastics or paper material and are of a size and strength suitable for transporting relatively large amounts of shopping. They are provided at their upper edge with two integral handles, most often created simply by excision of variously shaped parts of the preformed bag. Such excision in the manufacturing process of these bags is extremely wasteful and results in an inefficient handle design. Tearing is frequently experienced at the corners of the handles where the stress of the load is localized. Such handles are narrow in relation to the weight supported and the flexibility of the material frequently used can allow the handle to stretch and narrow still further, weakening them and allowing them to exert a more concentrated and therefore more uncomfortable pressure on the hands of the user. These problems are only partially overcome by reinforcing the handle section of the bags with an additional layer of, for example, plastics material.

Moreover, when the base of the bag comprises a single welded seam, there is a concentration of stress at the bottom corners which can cause the bag to burst. Both these problems are overcome by the bag of my invention, which in addition is economical to manufacture.

My invention provides a lay-flat bag or sack of plastics sheet material having gussets at both sides folded inwardly, the top and bottom edges of said bag having complementary arcuate configurations, the side gussets being trapped in the folded position by the bottom closure, the top of said bag being openable to provide four projections which may be knotted together in opposite pairs to substantially close the top of the bag.

The projections may vary in length, width or shape according to the diameter of the bag and may be provided with holes suitable for use as handles either before or after knotting the projections together.

It is to be understood that the term "bag" is a general term used to denote any container or receptacle which has a single opening or "mouth" and it includes within its scope bags and sacks of all shapes, sizes and uses.

The bag may be of any suitable plastics sheet material e.g. polyolefin such as polyethylene or polypropylene; vinyl polymer, such as PVC; polyamide; or cellulosic material such as viscose or cellulose acetate. The bag may be either impermeable or porous depending on its intended final use. If necessary, the top of the bag may be reinforced with a further layer of material which could, for example, be glued, stitched or welded onto the bag.

A further aspect of my invention provides a process for the manufacture of said bags which comprises:

1) dividing a tube of gussetted plastics sheet material into portions by transverse arcuate cuts; and

2) before during or after step 1), sealing the convex end of each portion to form individual bags.

This process may be performed by bag-making machinery of known type, adjusted to provide arcuate transverse cuts instead of the usual straight cut. To provide smoothly rounded projections of equal size and shape, it is preferred for said arcuate cut to have approximately the form of a sine wave with a peak aligned on the central longitudinal

axis of the tube and a wavelength equal to the width of said tube.

The sealing may take the form of heat or solvent welding, for example.

5 One embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings wherein:

Figure 1 shows a perspective side view of a bag according to the invention;

10 Figure 2 shows a perspective diagrammatic view of a process for the production of the bag of Fig 1; and

Figure 3 shows several perspective side views of embodiments of the invention in use.

15 The bag 1 comprises a tube of plastics material having side gussets 2, a heat sealed end 3 and a mouth 4 defined by the exposed edge of the plastics material. Said edge comprises four smooth curvilinear projections 5. After filling, the bag can be closed 20 by knotting together the pairs of opposite projections.

The smooth undulating design of the top of the bag is designed for maximum strength since it has no sharp corners or changes of composition or material which could allow a concentration of 25 stress to cause tearing. The progressive process of tying draws the widening tongues of material over the contents of the bag and effectively seals it without leaving any gaps or gaping unused material, and the weight of the bag's contents is spread 30 over a wide-area rather than at a narrow point. The pairs of projections may overlap to provide double thickness protection in the area of the wrap-over ties. The tied projections then have the further advantage that they themselves form 35 a wide, very strong, single lifting "grab handle" such that the bag and its enclosed contents can be easily and safely carried away. Moreover, the

rounded contour of the base results in a very strong burst-resistant construction.

In the process of the invention (Fig. 2) the bags are manufactured from a gusseted tube 5 6 of plastics sheet material which is sheared by arcuate cuts 7 whereafter the bases 2 of the bags are heat welded. It is apparent that this mode of manufacture results in an absolute minimum wastage of material, enabling an improved product to be 10 manufactured particularly economically.

It will be apparent that these bags are of particular application for use as refuse bags, such as, for example, dustbin, swingbin and pedalbin liners. The process according to the invention 15 makes the bags economical to manufacture and hence cheap to produce and the finished product is practical, simple and hygienic to use for the householder and refuse collector alike. Ease of handling is such that a refuse collector could thread at least 20 one bag onto his arm (Figure 3a), through the "grab handle", (up to his elbow) leaving his hand free to grasp at least one further bag (Figures 3b and 3c) or perform some other task which would improve the efficiency of refuse collection.

CLAIMS:

- 1) A lay-flat bag or sack of plastics sheet material  
5 having gussets at both sides folded inwardly, the  
top and bottom edges of said bag having complementary  
arcuate configurations, the side gussets being  
trapped in the folded position by the bottom closure,  
the top of said bag being openable to provide four  
10 projections which may be knotted together in opposite  
pairs to substantially close the top of the bag.
  
- 2) A bag according to claim 1 wherein said bottom  
closure has been heat-welded  
15
- 3) A process for the production of a bag according  
to claim 1 or 2 which comprises;
  - 1) dividing a tube of gussetted plastics  
sheet material into portions by transverse  
20 arcuate cuts; and
  
  - 2) before, during or after step 1, sealing  
the convex end of each portion to form individual  
bags.  
25
  
- 4) A process according to claim 3 wherein said  
cut has approximately the form of a sine wave with  
a peak aligned on the central longitudinal axis  
of the tube and a wavelength equal to the width  
- 30 of said tube.
  
- 5) A lay-flat bag according to claim 1, substantially  
as described herein.  
35 6) A lay-flat bag, substantially as illustrated  
in Fig. 1 of the accompanying drawings.

7) A process for the production of a lay-flat bag, substantially as illustrated in Fig. 2 of the accompanying drawings.